

## LOG OF MEETING

CPSC/OFFICE OF  
THE SECRETARY

**SUBJECT:** Flammability of plastic materials used in portable electrical appliances <sup>1999</sup>

**DATE:** July 27-28, 1999

**PLACE:** Radisson Hotel Columbus North,  
Columbus, OH

**DATE OF LOG ENTRY:** August 4, 1999

**SOURCE OF LOG ENTRY:** William H. King, Jr., ES *W.H.K.*

**CPSC PARTICIPANT:** William H. King, Jr., ES

### NON-CPSC PARTICIPANTS:

Dr. Carlos Hilado, Product Safety Corporation  
Gordon H. Damant, Inter-City Testing and Consulting Corporation  
Donald G. Kasten, Ohio State University  
Frank McGarry, National Assoc. of State Fire Marshals  
Frederic B. Clarke, Benjamin/Clarke Associates  
C. Patrick McShane, Cooper Power Systems  
Tim M. Lyons, American Electric Powers  
And other attendees at the 28<sup>th</sup> International Conference on Fire Safety

### SUMMARY:

Mr. King presented remarks based on the attached paper.



8-5-99 AB

CPSA 2 (b)(7) Cleared

*X* No Mfrs/Prvtl Bids on  
Products Identified  
Exempted by

## **Polymeric Materials in Portable Electric Appliances\***

by William H. King, Jr.  
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### **Abstract**

The U.S. Consumer Product Safety Commission (CPSC) staff support proposals to improve industry safety standards that address possible ignition and fire caused by the malfunction of internal components and connections within portable electrical appliances. Based on field incidents, the CPSC staff identified several provisions in the safety standard for polymeric materials used in electrical equipment, UL 746C, that warrant upgrading. CPSC staff also identified electrical connections, such as splices, wiring terminations and other mechanically assembled conductor contacts as potential sources of overheating. The proposals supported by CPSC staff are performance based and not design restrictive. Manufacturing consumer products that conform to the upgraded requirements can be accomplished in numerous ways, and does not have to be in conflict with other concerns, including environmental or recycling.

### **Background**

The U.S. Consumer Product Safety Commission (CPSC) is an independent Federal regulatory agency that was created in 1972 by Congress in the Consumer Product Safety Act. In that law, Congress directed the Commission to "protect the public against unreasonable risks of injuries and deaths associated with consumer products."

CPSC has jurisdiction over about 15,000 types of consumer products, from automatic-drip coffee makers to toys to lawn mowers. Some types of products, however, are covered by other Federal agencies. The Department of Transportation covers for example, cars, trucks and motorcycles; food, drugs and cosmetics are covered by the Food and Drug Administration; and alcohol, tobacco and firearms are within the jurisdiction of the Department of the Treasury.

CPSC works to reduce the risk of injuries and deaths from consumer products by:

- developing voluntary standards with industry
- issuing and enforcing mandatory standards; banning consumer products if no feasible standard would adequately protect the public
- obtaining the recall of products or arranging for their repair
- conducting research on potential product hazards
- informing and educating consumers through the media, state and local governments, private organizations, and by responding to consumer inquiries.

## **Proposed Voluntary Safety Standard Improvements**

With regard to small electric appliances, several years ago, the CPSC technical staff analyzed fire incident data for common failure scenarios. One scenario involved internal electrical failures that led to ignition of plastic housings of appliances, which caused fire to escape the confines of the product. CPSC staff began discussions of this scenario with industry representatives and the principal standards developer for electrical consumer products, Underwriters Laboratories (UL). These discussions led to the formation by UL of a group of interested parties identified by UL as their Plastics Flammability Ad Hoc Committee. Following discussions at meetings of this group that took place over the past several years, UL recently announced that they are proposing revisions to their safety standard UL 746C, "Polymeric Materials -- Use in Electrical Equipment Evaluations," and solicited comments.

The proposals have received the support of the technical staff of the CPSC, although the proposals have not been adopted by UL at the time this paper was prepared. The proposals include:

- new requirements for polymeric materials located within 3 millimeters of electrical connections other than welded connections,
- new definitions for attended and unattended products,
- end-product flame test requirements that are more clearly defined, and
- elimination of the exception that allowed less flame retardant enclosure materials when internal parts were insulated.

The new requirements for insulating materials located within 3 millimeters of electrical connections are based on requirements included in the standard promulgated by the International Electrotechnical Commission (IEC), and known as IEC publication 60335-1, Safety of Household and Similar Appliances, part 1: General Requirements, third edition, copyright 1991 as amended November 1994. In a separate but related action, UL has proposed a future standard for household appliances based on this IEC standard. The relevant part of the IEC standard applicable to electrical connections utilizes a test known as the Glow Wire Ignition Test which uses a specified Glow Wire Test Apparatus. (Additional details regarding this apparatus can be obtained from UL at their Melville, New York testing facility.) The test is intended to indicate whether polymeric materials at or close to electrical connections are sufficiently resistant to heat and fire.

The proposed new definitions for attended and unattended products add specificity to the current allowance in the UL 746C standard that permits the use of less flame retardant enclosure materials for appliances in which the presence of the user is essential for the appliance to function. For example, a typical electric can opener is considered attended because the product does not operate without the user being present to depress and hold the switch. On the other hand, a common clothes iron would be considered unattended under the new definition because the user can leave the appliance in a heating mode and not be present. The purpose of the new definitions is to categorize products as either attended or unattended for purpose of determining the flammability requirements that apply.

The proposed revision of the end-product flame tests is intended to include the application of the flame at locations of the enclosure that are close to electrical terminations and splices, in addition to electrical components that generate heat during normal operation as a consequence of the components' electrical resistance.

Regarding the proposed change affecting internal electrical components, this revision would eliminate the exception that currently exists in UL 746C which allows less flame retardant enclosure materials to be used when internal parts are insulated. This proposed change recognizes that insulated parts are no less likely to fail in ways that could ignite nearby enclosure materials than uninsulated parts.

### **Conclusion/Recommendations**

It is expected that the proposed changes, when implemented, will result in a reduction of fire incidents related to the appliances covered. Since the requirements are performance based, manufacturers of small appliances have options of using materials that not only conform to the electrical safety standard, but also conform to standards related to the environment.

CPSC staff encourages UL to adopt the changes, together with an effective date that will provide consumers with products that conform to the new requirements at the earliest possible time.

\* The views expressed in this paper are the author's, and do not necessarily represent the official position of the CPSC.